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Impact

The virtual reality (VR) program developed by SRNL mitigates the risks of removing and dismantling equipment during decommissioning of a uranium enrichment process building at the Portsmouth Gaseous Diffusion Plant:

- VR model allows verification of plans to remove and dismantle the pieces of equipment.

- VR training will enable personnel to effectively learn and practice sequential actions in a safe environment before conducting actual dismantling.

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Using Virtual Reality to Plan and Train for Hazardous Facility Decommissioning

SRNL has developed a virtual reality (VR) program to verify decommissioning plans and to train Portsmouth personnel to safely perform pending decommissioning activities in the X-333 Process Building at the Gaseous Diffusion Plant in Piketon, Ohio.

SRNL has perfected several ways to create VR representations of Department of Energy (DOE) hazardous facilities and equipment to aid in their safe and efficient deactivation and decommissioning (D&D). VR is a technique that allows people to view a computer, or virtual, representation of the real world. The virtual world can be created by laser-scanning a facility, importing computer-aided design (CAD) models, recreating 2D drawings in 3D in CAD, or a combination of methods. Factors such as the age of the facility, availability of the different data sources, access around equipment, and intended end use of the VR model all factor into the decision as to how best to create the VR environment.
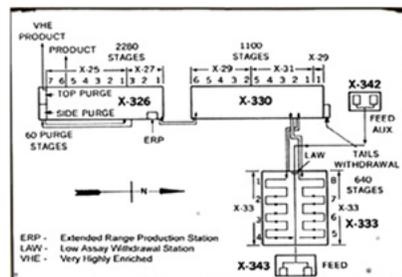
(top) Cell floor unit in Portsmouth X-333 Process Building and (bottom) diagram of Portsmouth Gaseous Diffusion Plant facilities and processes

The Challenge

D&D of DOE's legacy facilities and equipment across the country is a difficult undertaking. The facilities and equipment are complex, having diverse physical, chemical, and radiological hazards. In addition, there can be thousands of drawings defining a facility, and the personnel who designed, built, and operated the facility decades previously often are unavailable to share their knowledge with the current workforce.

D&D of the X-333 Process Building exemplifies those challenges. X-333 served as the entry point for all feed material into the Portsmouth uranium enrichment process; to handle the largest capacities, X-333 therefore housed the largest equipment. 640 pieces of gas

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processing equipment weighing about 33 tons apiece must be cut into segments to allow their steel shells to be safely placed in the Onsite Waste Disposal Facility. In addition to hazards associated with their large size and weight, they are also internally contaminated with radioactive material.

Innovative Solutions

VR is making an impact in size reduction of the 33-ton converters in X-333. The complexity of the piping and other equipment in conjunction with the hazards of accessing some areas in X-333 make laser scanning difficult. Completed in 1955, X-333 predates CAD software, so building information is contained in hand-drawn blueprints. SRNL determined that the most viable option for VR representation of X-333 was to recreate the 2D drawings of the facility in 3D.

The VR model is being used to verify the plans to segment the converters. Once the plans are verified, the VR training will enable personnel to effectively learn and practice specific physical actions and the critical sequencing of those actions in a safe environment before conducting actual dismantling of over 1,700 33-ton contaminated pieces of equipment.

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John Bobbitt of Savannah River National Laboratory (left) and Greg Meyer, Senior Vice President, Fluor Operations (right) work through a demonstration of the Virtual Reality training program designed to improve workers' and managers' abilities to safely perform segmentation and other work.

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